What does all this mean to the microcomputer industry?

Microcomputers are the ideal host platforms for neurocomputing and will be used with neural networks because of their flexibility. For instance, IBM PC ATs and compatibles can handle a wide variety of hardware and software attachments and can help provide numerous applications in a cost-effective manner.

Microprocessors are the universal path for applying neural networks across a broad base. Other ways are prohibitive in cost.

What approach are you using to implement neural networks?

The neurocomputer is a coprocessor board that plugs into the host PC, which controls the neurocomputer. The host PC is loaded with a User Interface Subroutine Library. Using the UI SL, users can call neural networks from software running on the host microcomputer as if they were subroutines. This makes neural networks easy to use anywhere they might be appropriate in a particular information processing application. This coprocessor approach allows users to freely mix programmed computing and neurocomputing so that each can carry out the processing it does best. Actually, it's simple to run.

Also involved is Axon, the machine-independent language for describing neural networks, existing or new. Just as an algorithm can be expressed in software, neural networks can be described in neurosoftware languages such as Axon. This approach allows the design of a combined programmed computing/neurocomputing system to be documented and maintained in a manner similar to current software maintenance procedures.

We have created network packages—most customers are only interested in four or five main networks—to be loaded into the neurocomputer on disk. The package usually provides only a general description of the network; users can tailor it to fit their needs.

On what theories are your implementations based?

Our Anza product is not specifically based on any one of the theories, but it will work with all neural networks: Rumelhart backpropagation, Hopfield, and Grossberg counterpropagation, and other networks by Grossberg and Kohonen. One package, for instance, uses the Spatiotemporal Pattern Recognition Network by Grossberg.

[Rumelhart, Hopfield, Grossberg, and Kohonen, among others, pioneered the development of neural networks.—Ed.]

What is your source of funding?

We have had two rounds of financing: (a) the seed round with some 15 private investors; and (b) syndicate venture capital company investment. I am not at liberty to divulge the amounts involved.

"It is irresponsible and extremely grandiose to think that anything can function like a brain. That is a long way off."

More about applications. How are they selected?

Our company offers courses to train individuals in neural network capabilities and limitations. These "domain experts" then go out into their areas of expertise, whether it be commercial or governmental, and identify possible applications. We will also assist in this process.

Speaking of domain experts, is there a potential for use with artificial intelligence and/or expert systems?

A great potential. These are very compatible technologies; they don't compete. AI people are applying neural computing alongside knowledge engineering technology. I think this area will be very fruitful over the next two years or so.

A group known as the "Connectionists" believe that computers will act like brains when they are built like brains. What is your comment?

Connectionists are a part of the neural network community who are trying to make a point: If you want behaviors more like humans or animals, you have to use a different paradigm than before. But it is irresponsible and extremely grandiose to think that anything can function like a brain. That is a long way off.

We're not talking about brain capabilities. AI has had its hype—machines that can see, hear, whatever, have been promised, but never delivered. Our present capabilities are modest in comparison, but still impressive. We don't need hype.

Will the new 32-bit operating systems affect the development of neural networks?

We're excited. Hecht-Nielsen will be fully compatible. The software on a microprocessor is limited now in terms of memory and pointer limitation. The universal applicability of microcomputers will be assured by unlimited address space and other features.

What else is new on the horizon for you?

We are now beta-testing a new package called the Adaptive Resonance Network for hypothesis testing developed by Grossberg and Carpenter. As an illustration of how it works, consider an Automatic Teller Machine that can speak and listen to a client. The problem has been getting the software to focus on one character at a time. With this package, the teller machine focuses on the voice of the person as distinct from background noise, or in sonar it can focus on just one vehicle. We expect this package to be available the first quarter of next year.

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